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ABSTRACT

In 1972, the University of Southern California School of Engineering established a 4-channel interactive instructional television network. It was designed to allow employees of participating industries to take regular university science and engineering courses and special continuing education courses at or near their work locations. Final progress reports of two National Science Foundation (NSF) grants which built upon this program are provided in this document. Through NSF funding, semi-public television classrooms were set up in two industrial parks allowing employees from many different small and medium sized companies to pursue part-time degree and continuing education programs. As part of the overall program, (1) special continuing education courses were developed; (2) other courses from other sources representing a broad range of topics were presented; (3) students were able to earn a certificate of Master's degree equivalency in engineering; (4) opportunities were provided for company personnel to preview videotaped courses from other sources which they might use in company training; (5) criteria for evaluating non-university video courses were developed; and (6) efforts to promote the use of this program in particular and video courses in general were made. (DC)

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Final Technical Report on
National Science Foundation

Grant SED 75 - 20820

DISSEMINATION OF CONTINUING EDUCATION MATERIALS
VIA TELEVISION DELIVERY SYSTEMS

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November 1980

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I. BACKGROUND

In 1972, the USC School of Engineering established a 4-channel interactive instructional television network. It was designed to make it easier for students to pursue graduate degrees in engineering on a part-time basis without having extensively to commute over crowded freeways.

In 1972, when the system began operations, it was rather novel. The only comparable systems were the Genesys Network in Florida; The Tager Network in Texas and the then newly established Stanford Instructional Television Network. Today, there are about a dozen such systems operated by engineering schools around the country, including those at the University of Michigan, University of Wisconsin, University of Maryland, University of California at Irvine, University of California at Berkeley, Georgia Tech and the University of South Carolina. These networks all use, at least in part, the ITFS band of frequencies, with capacities ranging from one to four channels. They all provide opportunity for live interaction using either FM radio or telephone.

There is another group of schools of engineering that use television technology to deliver education directly to industry, but by the physical delivery of videotapes of courses rather than by live broadcasts. Interaction is by delayed telephone office hours or by use of resident inplant tutors. Most notable among the tape delivery networks are MIT and Colorado State University.

The basic motivation for all these systems is to serve the part-time industry student working for a Master's degree. However, the networks are also powerful vehicles for the delivery of continuing education to industry employees. By making education more conveniently available, more employees are inclined to become involved in continuing education activities. This is particularly true for smaller companies that do not have intensive training programs of their own.

The essence of this NSF supported project has been to use the USC Instructional Television Network in various innovative ways to demonstrate how both live broadcast systems and tape delivery systems can be used to increase the number of industry employees participating in continuing education. Various approaches were proposed that were not being pursued by other existing networks at the time.

The project was made up of a number of smaller tasks whose goal was to demonstrate how television technology, whether live broadcast or tape delivery, could significantly increase continuing education activity among the nation's working engineers.

The purpose of each task, the problem addressed, the methods used and the conclusion or recommendation for further work

II. REGIONAL TELEVISION CLASSROOMS IN INDUSTRIAL PARKS

All the live broadcast networks operated by schools of engineering require that a company wishing to participate install its own inplant television receiving classrooms. This requires that company management provide from one to four dedicated rooms (depending on the number of channels over which different courses are simultaneously aired) and expend from \$2,000 to \$15,000 for equipment (depending on the number of channels and the nature of the talkback system). This is a major financial commitment, particularly for a smaller company, and has always presented an obstacle to recruiting a company into a university instructional television network.

Another obstacle is that although nearly all companies recognize the advantages of having thousands of hours a year of advanced continuing education material conveniently flowing into the plant, many managers will not make the decision to join a live network because they fear that the program will be too successful and course-fee reimbursement costs will get out of hand.

In the case, also, where the school involved is a private university, like USC, with a high tuition, management fears that because of the convenience of televised courses, employees currently attending lower cost state schools will want to switch to the television network.

Another obstacle is that since courses are broadcast both throughout the day and into the evening, management is concerned about employees taking time off during the day to attend classes - even though time lost is minimal because no commuting is involved. Still another obstacle is that company training staffs sometimes feel threatened by the great volume and diversity of programming offered by these television networks and resist its adoption by their company.

Despite all that these television networks have to offer in a cost effect way, because of all these obstacles, recruiting companies into a network is a slow process that requires much cultivation and persistence. It was therefore proposed under this grant to try to speed the penetration of the network into the industrial community by setting up semipublic television classrooms in the midst of two large industrial parks in the Los Angeles area. In this way, employees would be able to partake of the network's programs without a commitment to establish inhouse facilities by their own management. It was postulated that such classrooms would benefit mainly employees of small companies in the park that would probably never join the network, because of the costs of space and equipment. It was also postulated that this experiment would also indicate whether such a facility could eventually play a larger role as an industrial park learning center. Such a learning center might provide a diversity of advanced continuing education programs received live from a campus and augmented by videotaped courses. Employees in the park could conveniently partake of the center's offerings by travelling a mile or so rather than having to commute extensively throughout a dispersed urban area.

Two industrial park regional classrooms were established under this grant. The plan was to use NSF funds to purchase the receiving equipment and initially to pay for the lease costs of the space with the hope that the classrooms could become self supporting in a few years. The criterion chosen for self support, incidentally, was that basic university tuition was not to be counted in the income from the industrial park classroom - only the additional fees that were charged for the specific convenient services provided.

One classroom was located near the Los Angeles International Airport, 17 miles from USC, and the other in the San Fernando Valley, 30 miles from the campus. Each facility has 4 classrooms and live talkback by FM radio. They have been operated on an unattended basis with university personnel present only during course registration times. Registered students are given keys so that they would be able to enter at anytime. Both facilities are served by the Network courier who delivers class materials and picks up homework on a daily basis.

The two industrial park facilities have been eminently successful. They have indeed attracted students from companies that have not directly joined the Instructional Television Network. There are presently 26 companies in the basic network. However, employees from more than an additional 100 companies have taken courses at the industrial park television classrooms. In many cases, these employees complain that their own companies have not made the decision to install inplant facilities.

The industrial park classroom facilities have, as hoped, become self supporting. Special fees paid by more than the 200 students a year using the centers cover the considerable lease costs of the commercial space being used.

This experiment leads one to include that the concept of an industrial park learning center, operated by a university or even a proprietary commercial organization and providing diverse educational services to companies in the area is indeed viable. The center could be served either by live broadcasts from a university or other live distribution vehicle for continuing education materials, by libraries of videotapes, by live instructors, by computer terminals or by any combination of these services. The center could substitute for the training function of companies in the park too small to afford their own training staff. The closest known parallel to the USC industrial park centers are Control Data Corporation's centers using Plato terminals that have only recently been established.

III. MOTIVATING INDUSTRY EMPLOYEES TO PARTICIPATE IN CONTINUING EDUCATION VIA INSTRUCTIONAL TELEVISION

The USC Instructional Television Network, like those of most of the other engineering schools operating similar systems, were created primarily to facilitate the education of part-time students in industry seeking graduate degrees. A side benefit for companies joining the Network is that its employees are permitted to take the identical courses for non-credit continuing education purposes, usually at lower fees.

Since graduate university courses are generally fairly theoretical, there is always some resistance to taking them on the part of industry personnel who are not seeking a degree. They generally prefer more design-oriented, job-related courses. While they will take more theoretical courses if they need them for a degree, they are less tolerant of theory if the course is simply for non-credit continuing education purposes.

To satisfy the needs of both the university and industry, it would be advantageous to develop some courses for use over television that are more design oriented and practical but that still fulfill the requirements of academic rigor. Such courses could simultaneously be used for both degree and continuing education purposes.

Towards this end, a number of courses were developed under this grant in the electrical engineering and mechanical engineering areas. Design-oriented courses in such areas as radar systems, sonar, television systems, energy conservation and integrated circuits in electrical engineering and combustion, power, propulsion and fire hazards in mechanical engineering were developed for use over the television network. As mentioned, although these courses served the needs of degree-oriented students, they attracted good enrollments at the same time from employees interested in work related material in these fields.

Another plan to interest more industry employees in taking courses over the television network involved the concept of using television for the testing of Master's degree equivalency. It was realized that there are many industry employees who do not have Master's degrees but who, by virtue of extensive work experience, have equivalent preparedness and proficiency. Some may not even have BS degrees so that it would be impossible for them to obtain a Master's degree even if they wanted to expend the effort to achieve one.

The plan was to allow those industry employees who felt that had achieved a level of technical knowledge equivalent to the average Master's degree graduate of today to be tested by the USC School of Engineering. If they passed the required tests, the School would issue them a letter stating that by its current standards, the person was equivalent in knowledge to a current Master's degree graduate.

The television network would play the following role in this scheme. Industry employees enrolled in this program would simply audit the courses coming into their companies over television that are required for, say, the Master's degree in electrical engineering to become familiar with the range of material on they would be tested. They would then take the final examinations in these required courses whenever they felt ready. If they passed all the required courses with the required grade point average, they would be deemed to be equivalent to a Master's degree candidate and would be given an equivalency certificate.

The program was widely publicized among the companies in the USC Television Network. A number of employees did express interest and started the program. However, only one employee persisted to the end. This person did not have a B.S. degree but had achieved considerable technical responsibility in this company. He audited his courses over television and took final examinations in eight required courses. He was issued a certificate and has since used it in improving his professional standing within the industry.

IV. USE OF INSTRUCTIONAL TELEVISION NETWORK AS CONTINUING EDUCATION DISTRIBUTION VEHICLE FOR VIDEOTAPED COURSES

USC's Instructional Television Network was originally established to make it easier for engineering students to earn a degree on a part-time basis. However, it was soon recognized that the Network was also a powerful tool for the delivery of continuing education. Initially, special continuing education courses were presented by live instructors over the network. Also, some of the credit courses were modified to be more design oriented so that the same course could be taken both by a student working for a degree and an employee interested in continuing education for increased proficiency on the job.

It was soon realized that the Instructional Television Network was not unlike a commercial television station in that it could be used for local distribution of material from other sources (on videotape). Therefore, as part of this project, videotaped courses suitable for continuing engineering education were obtained from other universities and other types of organizations and televised or "distributed" to industry in the Los Angeles area via the broadcast network.

Material has been used from roughly 15 other organizations.

In many cases, a mutually beneficial arrangement has been developed whereby a portion of the tuition collected is returned to the organization supplying the videotaped courses. In other cases, USC in turn has provided courses to other organizations that have live broadcast systems.

USC originated this arrangement and still is today the largest user of the taped courses from other organizations in its broadcast network. This type of inter-university cooperation has since expanded with the formation a few years ago of AMCEE - a consortium of universities that use television (either live or tape delivery) for continuing education. AMCEE stands for Association of Media Based Continuing Education for Engineers.

V. INCREASING INDUSTRY AWARENESS OF VIDEOTAPED CONTINUING EDUCATION MATERIALS

Although there has been some improvement in the situation in the last two years, when this project first began, industry was generally poorly informed about the great wealth of continuing education materials beginning to become available on videotape and consequently was been making little use of this opportunity for the continuing education of its engineers. One of the major goals of this project has been to develop innovative ways of improving industry awareness of the existence of these materials and for motivating companies to use them.

It was recognized that the use of videotaped courses is not as easily promulgated as printed materials because they are not easy to "browse" through, generally involve a cost even to preview and require preparations (setting up equipment) to demonstrate. Since the USC Instructional Television Network was a convenient communication link to the training staffs of many of the major companies in the Los Angeles area, it was felt that its use to preview videotaped courses might be a useful concept. Therefore, under this grant, an experimental preview service was initiated. USC obtained the first tape of a number of videotaped courses from universities and other sources from around the country and broadcast these tapes at a specified hour each week for the benefit of training staffs and other interested parties in the companies served by the network. The previews were convenient for companies to watch - they simply turned on their sets at the specified time.

They were told that if they wanted to buy or lease a course, USC would place them in touch with the vendor. On the other hand, if a sufficient number of companies were interested in the course, USC would obtain it and broadcast it over the air.

Over the life of the grant, 48 courses from 9 organizations were previewed over the air. Many of the companies watched these previews and reported back their reactions and desires to USC.

It is believed that this concept - use of a broadcast system to preview videotaped courses - is an efficient and effective way to promote the use of videotaped courses for the continuing education of engineers. If the concept could be expanded in scale, for example, by use of satellites, to reach a number of distribution systems, previews could be made available simultaneously to thousands of companies. AMCEE, a consortium of 21 universities using television for the delivery of continuing education of engineers, has since adopted this idea and included it as part of a larger proposal to HEW for a satellite distribution network.

Another approach to increasing the awareness of industry of videotaped continuing education materials involved visiting companies with sample tapes, trying to interest them in viewing them and ultimately in leasing or purchasing the entire course for inhouse use. Since it was discovered that many companies did not even own a videotape player, several units were purchased under the grant and loaned to companies together with sample tapes to show to their engineers. This arrangement was particularly important for small to medium sized companies that had never invested in video equipment.

These visitations and loans of equipment have helped improve industry awareness and acceptance of the value of videotaped courses for continuing education. A number of courses have been leased or sold and this mode of education is being more and more accepted as instructionally effective as well as cost effective.

VI. DEVELOPMENT OF EVALUATION CRITERIA FOR VIDEOTAPED COURSES

As more and more companies use videotaped courses from universities and other organizations for the continuing education of its engineers, there is a growing need for some means by which to prejudge the appropriateness and effectiveness of these courses. It is not convenient for industry to preview videotaped courses; previews generally involve some cost to procure and require preparations to set up and to show to interested engineers. The recent experience of AMCEE (Association for Media-Based Continuing Education for Engineers) indicates that companies leasing its taped courses are often deeply disappointed because the courses they ordered were not sufficiently closely addressed to their specific needs or were poor in technical recording quality.

As part of this grant, it was decided to try to develop a set of evaluation criteria that would be useful to industry which would be based on the reactions of employees in the USC Instructional Television Network to certain courses offered over the Network. Employee reactions relative to certain criteria would be compiled from which ratings would be developed that could be made available to any company interested in leasing or purchasing the courses involved. Since company employees in the companies in the USC Network are representative of employees in similar industries elsewhere, it was felt that a rating scheme derived from their reactions would have a universal relevance.

This rating process was carried out for 58 videotaped courses from 15 different organizations that were leased by USC and broadcast over the Instructional Television Network to its client companies. These ratings were offered to any interested party.

Although few requests were received for the ratings, it is nevertheless believed that this type of information is needed and that such a program, if mounted on a larger scale and better publicized, could serve a useful function.

Final Report on
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DISSEMINATION OF CONTINUING EDUCATION MATERIALS
VIA TELEVISION DELIVERY SYSTEMS

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November 1980

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I.

OBJECTIVE OF GRANTS

This final report summarizes progress on two grants. Since the second grant was an expansion of the first, and was by way of a renewal, the principal investigator was advised by his contract monitor at the time to submit a single final report at the termination of the second grant on the entire project.

The first grant, entitled Continuing Education by Interactive Instructional Television was awarded July 15, 1972 and ran for two years. The award amount was \$99,525. The follow-on grant, entitled, Dissemination of Continuing Education by Television Delivery Systems for \$76,620 was awarded on July 1, 1976 and ran until January 1, 1979.

In 1971, the USC School of Engineering received an \$825,500 grant from the Olin Foundation to develop and construct an interactive instructional television system to serve the part-time degree, continuing education and retraining needs of the extensive Los Angeles industrial and governmental community. The system began operation in September 1972, broadcasting over four ITFS channels, with initial course offerings in engineering, computer science and mathematics.

With this excellent vehicle for the delivery of continuing education, one of the first university ITFS systems serving industry in the nation, proposals were submitted to the National Science Foundation for grants to explore innovative uses of the system. NSF support was not requested for basic operating costs of the network but, rather, for certain unique, experimental applications not being pursued by the other similar systems in use at the time.

In the intervening years, a considerable number of such ITFS networks came into being at universities throughout the nation.

The goals of the two NSF grants were:

1. Establishment of Industrial Park Television Classrooms

To establish regional television classrooms in two large industrial parks in the Los Angeles area to make available part-time degree and continuing education opportunities to employees of small and medium sized companies that might not be able to afford the equipment and space needed to establish inhouse television receiving classrooms.

2. Development of Instructional Television Network as an Effective Means for Continuing Education of Industry Employees

Development of special courses aimed at the continuing education of industry employees as well as the use of the Television Network as an effective distribution vehicle for the best continuing education materials available from sources throughout the country.

3. Experimental Masters Equivalency Certification Program over Television

To develop a program over television for Masters degree equivalency certification for industry employees who may not have undergraduate degrees but who might be able to perform well in a Master's program in engineering in competition with regular students.

4. Promotion of Use of Video Tapes for Continuing Education

To develop means for increasing industry awareness of the growing libraries of videotaped courses that are suitable for the continuing education of engineers. This goal would be accomplished by two techniques:

a. A tape preview program was to be developed for broadcast over the USC Television Network. Previews of videotaped courses suitable for continuing education of industry employees would be obtained from sources throughout the country and would be broadcast to interested parties in the companies tied into the USC Network.

b. A liaison person would be hired who would visit companies in the industrial parks where the USC regional television classrooms were located to interest training officers in trying videotapes for the continuing education of their employees. As part of this plan, the liaison person would also loan video tape players to these companies to indoctrinate them in this approach to continuing education.

5. Evaluation Program for Videotaped Courses for Continuing Education

An evaluation program for videotaped courses was to be developed based on reactions to some of these courses provided to local industry and the results were to be made available to other potential users around the country.

The results obtained in these specific efforts are documented in the following pages.

THE USC INTERACTIVE INSTRUCTIONAL TELEVISION NETWORK

In 1972, with a major grant from the Olin Foundation, USC's School of Engineering established a four-channel instructional television broadcast system with talkback to bring regular university science and engineering courses, as well as special continuing education courses on a broader range of topics, to employees in the greater Los Angeles area, at or near their work locations. The system, operating on Instructional Television -- Fixed Service (ITFS) frequencies (2500-2690 MHz), transmits approximately 100 regular upper division and graduate courses and 50 special continuing education courses a year to students located within approximately a 30-mile radius from transmitters located in the Hollywood Hills. Remote students, communicate with the instructor on campus both by FM radio or telephone and a daily courier service delivers and picks up class materials.

Such private television broadcast systems have been used by universities to reach employees in industry for some years. There are presently 15 networks of varying capacity in different regions of the country linking universities to their local industrial communities.

The USC Instructional Television Network provides five thousand hours a year of educational programming of benefit to business and industry transmitted directly to company premises--eliminating for employees the wasted time, effort and expense of commuting to classes over crowded freeways. For small companies, the program can serve in place of an inhouse training program; for larger companies, it can supplement and provide added diversity to inhouse programs.

The Television Network is designed to meet two needs:

- 1) For high technology industry, it provides regular USC engineering mathematics and computer science courses for either degree credit or noncredit continuing education. It also televises seminars on rapidly changing technological developments presented by visiting authorities from universities and industrial organizations throughout the world.

2) For all business and industry, the system provides short continuing education courses and special seminars on science, technology, business, management and personal development topics. They are broadcast mainly during the noon hour and are aimed at a broad range of company employees--from secretaries and technicians to engineers and managers. These courses are both live and on videotape. Many of the videotaped courses are obtained from a consortium of other universities involved in continuing education by television. Previews of educational tapes available from a variety of sources are also occasionally televised for the benefit of industry training staffs. Some feeling for the nature of this type of programming is provided by some typical recent events:

- A live lecture series on Contemporary Issues in World Economics presented by 20 noted authorities brought to the campus from around the world.
- Videotaped short courses on Getting Started in Microprocessor System Design supplied by the Stanford Instructional Television Network and Digital Signal Processing from MIT.
- A live one-hour seminar on Wind Effects on Buildings by a distinguished civil engineering professor from an eastern university.
- A seminar series It's Your Business--a Program for Company Management sponsored by USC's Center for the Study of Private Enterprise.
- A Women's Financial Management seminar series
- Programming courses on FORTRAN, BASIC and PASCAL

Part-time students in industry may take regular televised University courses for graduate degree credit. Others may take the same courses at lower fees as auditors or as non-degree students who receive a grade but are not formally enrolled in a degree program. The latter, if they are subsequently accepted for a degree program, can use a certain number of non-degree units for degree credit upon retroactive payment of tuition differentials.

Courses are being broadcast presently to 28 locations throughout the greater Los Angeles area with approximately 2000 television registrations a year in regular USC courses with an additional 3000 in continuing education courses.

Companies in the USC instructional television network pay a monthly participation fee that depends on total enrollment level at the facility being served by the television system. A company also purchases necessary receiving equipment or leases it from the University. Equipment includes a parabolic dish, a downconverter, a talkback transmitter, microphones and television sets. Most of the cost of the company installation is in the talkback transmitter. However, recently, telephone talkback using automatic dialers has been introduced into the system as a lower cost option.

Since different courses are broadcast over the four channels, a company installs from one to four receiving classrooms depending on the number of channels it wishes simultaneously to receive -- although a single classroom can be switched to any of the four channels.

University operating costs for the system are covered by the company participation fees and also by a television surcharge on each course taken by a degree student. This surcharge is roughly equal to what the average student saves in travel expenses by not having to commute to campus. Additional income is derived from auditors who pay about one fifth of regular tuition, from non-degree students who pay about one half of regular tuition and from enrollments in continuing education courses.

University tuition paid by regular students taking courses by television is not credited towards television network income. The system is now self supporting based solely on fees paid for the special services it renders.

Appendices A through F summarize the operation of the Network today. Appendix A is a brochure describing the system. Appendix B lists regular USC courses broadcast during a typical recent semester. Appendix C lists continuing education courses broadcast during the same semester. Appendix D lists companies in the TV Network. Appendix E lists participation fees and student fees charges industry for use of the Network. Appendix F shows the growth in enrollment over the years.

III. ESTABLISHMENT OF INDUSTRIAL PARK REGIONAL TELEVISION CLASSROOMS

Large industrial parks, with scores of companies clustered close together, are growing in number, primarily in suburban areas. Such clusters provide new opportunities for delivery of continuing education by universities to industry.

When the USC Instructional Network was first established in 1972, it was expected that many of the major companies in the Los Angeles area would join the Network and that has occurred. However, because there are literally thousands of companies in the area, many of them small and located in industrial parks, it was proposed under this grant to establish regional television classrooms in two representative industrial parks to speed penetration of the Network throughout the industrial community of Los Angeles. Some of these companies are too small to be able to afford the participation fee and the space required to set up their own television classrooms for their employees. These regional classrooms offer their employees the opportunity to travel one or two miles to take classes rather than tens of miles to the campus.

Two regional classrooms were set up in space leased by the University under this grant. The first, established in 1972, is in the International Center near the Los Angeles International Airport, 17 miles from USC. This facility is still functioning today and is quite successful with a large number of students. The second regional classroom was established in 1974 in the Warner Center in the San Fernando Valley, 30 miles from USC, to serve companies in that area. This classroom was also quite successful but had to be abandoned in 1979 because of problems with the lease. It has since been re-established at a church a few miles away from the original site. The church location is actually an efficient arrangement since Sunday school classrooms that are unused during the week are being leased at a cost far less than for commercial space.

Both regional classrooms have 4 classrooms, one for each ITFS channel assigned to the University. They also have FM talkback systems linking them to the campus and are served by a daily courier service that delivers class materials and picks up homework. A photograph of the classroom in El Segundo is provided as Appendix G.

Advertising the services offered by the television network to the regional classrooms has not been as easy as with inplant facilities. With the latter, participating companies, by installing classrooms, have made a full commitment to the instructional television program and widely publicize its offerings to their employees. For regional classrooms, publicity is by direct mail and word of mouth. Nevertheless, the visibility of the regional classrooms has grown steadily over the years of this grant and with its enrollments.

Most of the students attending the regional classrooms come from companies in the immediate vicinity but sometimes, in the case of evening or early morning classes, employees living in the area attend classes on their way to work. Many remonstrate with their companies for not having inplant facilities and appreciate having a convenient place nearby where they can take courses either for credit or for continuing education.

The regional classrooms operate unattended. A person is present during the first week of classes to register students and to issue keys. After that the facility is visited only by the courier delivering materials and occasionally by a TV technician who checks out the equipment.

Although there are 26 companies in the USC Television Network that have made the decision to allocate inplant space for television classrooms, employees from more than 100 additional companies have attended the two regional classrooms in El Segundo and Woodland Hills, thereby making the USC system the most

"pervasive" TTV network in the country. More than 400 students a year take courses at these two facilities.

Some of the companies represented by students who have attended the El Segundo Regional Classroom are:

- . Magnavox Research Labs
- . TRW Systems
- . Xerox Data Systems
- . Rockwell International
- . Space Applications
- . International Rectifier
- . Agababian Associates
- . Comsat Corporation
- . Wems Inc.
- . Logicon
- . Del Mar Engineering
- . AIL Information Systems
- . Hughes - Space Systems Division
- . U. S. Air Force - Space and Missile Systems Organization
- . Fluor Corporation
- . Fairchild - Stratos Division
- . Mobil Oil
- . Bayley Martin Inc.
- . Computax Corporation
- . Northrop Corporation
- . Honeywell
- . State of California - Division of Oil and Gas
- . Marquart Aviation Corporation
- . Western Airlines
- . Wangco, Inc.
- . WPL Consultants
- . Aerospace Corp.
- . The Austin Co.
- . Burton Electric
- . Goodyear
- . K-Lin Specialties
- . Texaco
- . Western Airlines
- . Long Beach Naval Shipyard
- . IBM
- . Consolidated Controls
- . Singer Instrumentation
- . Chevron Research
- . Motorola
- . City of Inglewood
- . Atlantic Richfield
- . Airesearch Corp.
- . Purex
- . A. F. Millron Co.

- . Griot Associates
- . Lackin Optical
- . Computer Science Corp.
- . Electronic Memories
- . Ampex
- . University Computing
- . Information International
- . GTE Data Services
- . Martin Marietta
- . Flying Tiger Airlines
- . Computer Transmission Corp.
- . U. S. Geodetic Survey
- . Continental Airlines
- . Airborne Instruments Lab
- . Chevron USA
- . WEM Inc.
- . Advanced Telecommunications
- . Boeing Computer Services
- . Imperial Technology
- . Thums Inc.

Some of the companies represented by attendance at the Woodland Hills facility are:

- . Litton Industries - Guidance and Control Division
- . Weston Hydraulics
- . A. A. Mathews Inc.
- . Hughes - Missile Systems Division
- . Pertec Corporation
- . Radiant Energy Systems
- . Electron Corporation
- . Electronic Arrays
- . Rockwell International - Rocketdyne Division
- . U. S. Naval Weapons Systems Engineering Station
- . Bendix Corporation
- . Singer Librascope
- . Controlmation
- . Crane Corporation - HydroAire Division
- . Burroughs Corporation - Westlake Division
- . A. Smith Corporation
- . Hirsch and Associates
- . Bunker Ramo
- . Dynamic Sciences
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- . Ralph M. Parsons Co.
- . Terminal Data Co.
- . Aeroproducts
- . Macrodata
- . Perceptronics
- . EMM Co.
- . Truesdale Labs
- . P. L. Porter Co.

- .Kraft Foods
- .Lexitron
- .Firebilt Corp.
- .Lockheed
- .Synergex
- .Future Titanium
- .Data Products
- .Informatics
- .Electronic Memories
- .J.M.R. Instruments
- .Hydroaire
- .Electronic Arrays
- .Fischback and Moore
- .King Nutronics Co.
- .Compatá

It should be emphasized that NSF funds paid for the television receiving equipment for these classrooms and initially for the costs of leasing the commercial space during the period of the grant. However, as predicted in the original proposal, the classrooms have now become fully self-supporting of lease costs from special fees paid by attending students. Thus, it has been demonstrated that students are willing to pay enough for the convenience afforded by these regional facilities to cover not only University tuition but also the cost of leasing the space for the regional classrooms. Thus, it can be said that this phase of the project has been a complete success. It has been demonstrated that establishing regional classrooms in industrial parks is an effective means of providing education via television to working engineers and that such a project can be made self supporting.

A photograph of the El Segundo Regional classroom is shown in Appendix G.

IV. USE OF TELEVISION SYSTEM FOR CONTINUING EDUCATION AND ITS ROLE AS A DISTRIBUTION NETWORK

Another goal of the NSF grant has been to develop special courses designed to interest practicing engineers in becoming more involved in continuing education to avoid technical obsolescence. By providing interesting, timely and more practically oriented (design) courses, and by using television to make them conveniently available, it is hoped to overcome some of the psychological barriers that prevent some engineers, particularly older ones, from carrying on a regular regimen of continuing education. Design-oriented course sequences in Computer Aided Mechanical Design and Combustion Technology were developed for presentation over television. The series included such courses as:

- ME 050 Principles of Mechanical Design
- ME 060 Principles of Chemistry and Thermodynamics
- ME 051 Design of Mechanical Elements and Systems
- ME 061 Basics of Combustion Processes
- ME 062 Power and Propulsion
- ME 063 Fire and Hazards and Pollution

Descriptions of all the courses in the two series are found in Appendix H.

Subsequently, eight courses in electrical engineering were developed to serve both degree and continuing education purposes. These courses are also more design than theory oriented and the material is arranged so that minimal prerequisites or follow on courses are needed. The courses are:

- COMPUTER CONTROL OF INDUSTRIAL PROCESSES
- RADAR SYSTEM DESIGN
- NEW ENERGY SOURCES AND TECHNOLOGY
- TELEVISION SYSTEMS
- INTEGRATED CIRCUIT TECHNOLOGY
- ENERGY CONVERSION DEVICES
- SONAR SIGNAL PROCESSING
- APPLIED ENGINEERING ANALYSIS

A more complete brochure describing these courses is included as Appendix I. Many of these courses are now offered regularly over the television network.

The mainstay of the television network is the complement of regular semester-long University courses broadcast primarily for the benefit of part-time graduate students in industry working towards a degree. The use of the identical courses by auditors and non-degree students yields an additional convenient and cost-effective contribution to continuing education for industry employees.

From the beginning, it was realized that the instructional television network was such a valuable resource that it should be used to deliver other than technical University courses and seminars to industry clients. Towards this end, a program of special non-credit courses was developed to serve the continuing education needs of industry and aimed at a much broader cross section of company personnel than the technical professional staff. These courses are generally short, to minimize the personal commitment needed, and cover topics on technology, business, management and personal development.

The noon hour was chosen for this series of courses -- called the Noon-time Employee Development Program -- because this period is both outside of working hours and a time when many employees would like something productive to do on their own behalf.

Because the courses are generally between 6 to 20 hours in length, and are transmitted over four channels, it is possible to schedule up to 50 subjects a year during the single noon-time slot. Additional hours could be devoted to the Employee Development Program before and immediately after the working day in the future.

The noontime program is popular and enrollments are steadily growing. Course fees are modest and a wide diversity of subjects ranging from microcomputers to speed reading is offered. A representative schedule of courses under this program is provided as Appendix C.

For large companies with well developed training courses, the noontime television program can complement inhouse continuing education programs. For small to medium sized companies that may not have separate training staffs, the noontime program can actually serve as the inhouse training program. It is not only convenient but highly cost effective by enabling costs to be distributed among many companies through the use of technology.

While many noontime courses are offered live over the television network, many are on videotape. These videotaped courses are obtained from such sources as other educational institutions, industry and professional societies. For example, videotaped courses from the following organizations have been broadcast to Los Angeles industry over the USC instructional television network: the Association for Continuing Education (ACE) at Stanford, MIT, Colorado State University, U. of Arizona, U. of Wisconsin-Extension, Purdue, U. of Michigan, U. of Minnesota, Southern Methodist, AMCEE, Rochester Institute of Technology, Lawrence Livermore Laboratories, Texas Instruments Learning Center, Society for Manufacturing Engineering and the Institute for Electrical and Electronic Engineers.

Use of the videotapes of other universities is often based on an arrangement whereby a percentage of the gross tuition collected is returned to the supplier institution.

Broadcast videotaped courses are generally offered on a self-study basis with study material supplied to remote students by the courier service. However, in some cases, a discussion leader or tutor is provided over television to supplement the taped lectures.

The Television Network, used in this manner, is, in effect, acting as a distribution network, obtaining continuing education courses on videotape from universities and other schools from around the country and making them conveniently available to companies in the Los Angeles area. It is functioning like a regular television station that distributes programs from national sources to the local community. The USC Network was the first university ITFS system to function in this mode although other schools have become aware of the USC experience and are now also broadcasting videotapes. In fact, some of the schools from which USC originally obtained materials have begun to use USC-produced courses in their own networks.

The next step in this analogy to regular television stations would, of course, be an interconnection of ITFS network, around the nation by satellite or other "live" means.

This cooperative interchange of material has received a stimulus with the recent creation of AMCEE (Association for Media-Based Continuing Education for Continuing Education for Engineers), is a consortium of about 20 universities that uses television for the delivery of continuing engineering education - some by physical delivery of tapes to industry and some by "live" ITFS systems. The consortium promotes cooperation among schools in the production, distribution and exchange of materials. Among the AMCEE schools, USC is still the largest user of other universities' courses in its broadcasts to its local industrial community.

V. USE OF THE TELEVISION NETWORK FOR CERTIFICATION
OF MASTER'S DEGREE EQUIVALENCY IN ENGINEERING

As already mentioned, industry students can audit television courses over the USC Network at costs far below the normal tuition for degree purposes. It was proposed that the television network might be used as a vehicle for equivalency testing of Master's degree level preparation and proficiency. Many working engineers have, through on-the-job experience, developed Master's level proficiency. It was proposed to allow industry employees to register as television auditors in courses required for a Master's degree in electrical engineering at USC. As auditors, they would simply review the material covered in the courses; they would not turn in homework nor take examinations. This (low cost) review would enable them to become aware of the scope of the material for which they would be responsible. They would then be allowed to take the final examination in each of the courses required in competition with regular students in the class. If they achieved at least the minimum average grade point average over all courses required for a Master's degree in Elective Engineering, they would be issued a certificate that certified that, even though they did not have the degree, USC certified that they had equivalent knowledge and technical preparedness. The employee could then use the certificate to advance his or her professional standing.

The essence of the proposed experiment was to determine the extent of interest of industry employees in seeking equivalency status on this basis and to explore the nature of the equivalency statement needed to adequately motivate a student to undertake the program.

The program was announced to all companies in the USC TV Network and 20 company employees expressed interest in the program. Most were older employees who had received a B.S. degree some years earlier and did not go on for a Master's degree or who had started graduate work but had not persisted. A few did not even have undergraduate degrees.

USC worked with the interested employees trying to motivate them to audit all the required classes and to take the examinations. Five of the employees started to audit classes. However, only one employee persisted to the end. This employee audited 8 courses over television and took the required final examinations. He was an experienced design engineer who did not have a B.S. degree. In his equivalency program, he received 3 A's, 5 B's which, under normal circumstances, would have qualified him for an M.S. in Electrical Engineering.

Despite the fact that only one employee persisted, the project was successful in principle. The employee's original letter of intent, his course grades and the Letter of Master's equivalency issued to him by the University are provided as Appendix J.

It is felt that the concept has merit and should be pursued on a larger scale by other university ITV systems or by "open university" types of programs.

Despite the revolutionary impact of videotape technology, and the resultant proliferation of libraries of videotaped courses, industry is not using this approach to any significant degree for the continuing education of scientists and engineers. And, despite their low cost, many companies, particularly smaller organizations, do not even have a videotape player.

Another reason for the thus far infrequent use of videotape courses has to do with their low visibility and relative inconvenience. Unlike books, tapes are not easy to "browse" through and considerable motivation and effort are required on the part of an industry training director to obtain preview tapes and to set them up for a showing to determine if there is sufficient interest to lease the full course. For these reasons, it was felt that an effective means was needed to develop industry awareness of the growing libraries of available videotaped courses that might fill their continuing education needs. As part of this effort, the USC ITFS broadcast network was used to preview the first lecture of videotaped courses obtained from various sources from around the country. These previews were broadcast at specific hours in accordance with an advance schedule so that company training officers or interested technical personnel would be able to conveniently determine if a particular course fills a company need.

The companies were told that if, after viewing a preview, they were interested in a course for inhouse use, USC would put them in touch with the supplier so that they might be able to lease it directly. On the other hand, they were told that if a sufficient number of companies in the ITFS network were interested in a course, an effort would be made to obtain the course and broadcast it over the ITFS system on an individual enrollment basis.

The following typical notice accompanied announcements of tape previews:

To: Company Training Staffs

"The next series of previews of videotaped and film courses for continuing education will be held in accordance with the schedule below. This program, supported by a grant from the National Science Foundation, aims to increase industry awareness of the growing libraries of continuing education instructional materials available from universities, professional societies and industry sources. This particular series will preview courses from the Open University Educational Media, Inc.. Company training personnel and interested technical staff are invited to preview these films. The "previews" vary in length from 30-60 minutes. The films may be viewed at participating company television classrooms or at the USC Regional Classrooms at the locations listed below. In the latter case, a call should be made to the TV Program Office (743-7663). If a sufficient number of companies are interested in a course, it may be scheduled for a later date. The TV Program Office will also assist any company in directly leasing courses which it might like to have."

A typical announcement is included as Appendix K, and a letter of interest from a commercial supplier is Appendix L.

A number of suppliers — educational, industrial and commercial — were contacted and offered the opportunity to preview their courses to companies in the USC Instructional Television Network at no cost for the specific purpose of promoting leases or sales of their material. The offer was also made publicly by means of news items in the "CES Newsletter" of the American Society for Engineering Education, the C. S. Tepler publishing company's "Videoplay Report", and "The Catalog".

A number of expressions of interest were elicited from universities and commercial organizations. Interestingly, however, despite the fact that the offer constituted free publicity for potential sales, it was very difficult to get definite commitments from such commercial tape distribution organizations as McGraw Hill, Deltak and Advanced Systems. Only Advanced Systems finally opted to preview some of their tapes. The problem with the commercial organizations appears to be a fear of having their material broadcast to an unaccountable audience. They were concerned with

copyright problems and pirating, even though only a short preview of the entire course was involved. However, a number of universities and commercial groups did offer courses for preview.

The following previews were presented over the ITFS system during the course of the grant. Grant funds were used to lease the preview material and to support the airtime used to broadcast the material.

UNIVERSITY OF WISCONSIN

Introduction to Materials Science
Logical Thought and Logic Circuits
Introduction to Numerical Control
Digital Technology

TEXAS INSTRUMENTS

Basic Electricity and DC Circuits
Microprocessors
Linear Interface IC's
MOS IC's
Semiconductor Memories

OPEN UNIVERSITY (GREAT BRITAIN)

Enzymes In Industry
Thermal Analysis
Bart 3-Systems Interactions
Thermodynamics
Heart of Computers
Role Playing

COLORADO STATE UNIVERSITY

Microprocessor Technology and Applications
Designing with the 6800

DALLAS COUNTY COMMUNITY COLLEGE

It's Everybody's Business
An Intro. to Business in the U. S.
Writing for a Reason -Basic Writing Skills
Earth, Sea and Sky-Intro. to Earth Science

LAWRENCE LIVERMORE LABORATORIES

Intro. to COBOL & Business Programming
Probability Theory & Monte Carlo Techniques
Mechanical Testing of Material
High Strain Rate/Shock Behavior of Materials

CENTER FOR ADVANCED EDUCATION
MASSACHUSETTES INSTITUTE OF TECHNOLOGY

Mechanics of Polymer Processing
Fundamentals of Polymer Melt Mechanics
Application to Polymer Processing
The Preface to Calculus
Differential Equations
Linear Algebra
Surface Chemistry
Electrokinetics & Membrane Phenomena
Compiler Languages
Macroeconomics
Microeconomics
Intro. to Experimentation

ASSOCIATION FOR CONTINUING EDUCATION
(Associated with Stanford University)

Microwave Tubes and Solid State Devices
Introduction to Chemical Engineering I
Noise Control Engineering
Refinery Combustion Systems
Introduction to Petroleum Refinery Processes

ADVANCED SYSTEMS INC. (Commercial Tape Supplier)

Effective Interviewing
Finance for Non-Financial Managers: Profitability & Cash Flow
Advanced COBOL: Processing NonSequential Files
MVS (Multiple Virtual Storage) Concepts and Facilities
Production and Inventory Control in the Computer Age
Power Negotiations

The impact of the tape preview program is difficult to assess and document. Its purpose was not to accumulate a large body of data that would show a relationship between the viewing of previews and subsequent leasing of entire courses. Rather, the intent was to determine whether there was significant interest in this type of service so that if it were extrapolated to a much larger scale distribution system than a single university's ITFS network (e. g. to a satellite system), it would be a practical and viable way of disseminating information about videotaped courses to potential users.

Because the USC network does not have a way of monitoring viewers, except for attendance at courses and events for which a fee is charged,

it is not known how many people in the companies in the network actually viewed the previews. However, it is known that some training people and engineers did watch previews because of actions they subsequently undertook.

A few examples are presented:

1) As a consequence of interest on the part of two companies in the preview of the University of Wisconsin's course on "Numerical Controls", the entire course was leased by USC and broadcast over the television network.

On the other hand, another viewer of the preview from a third company wrote an internal company memo saying that the course was superficial and offered only a speaking knowledge of the subject.

2) After viewing the preview of MIT's course on "Surface Chemistry", the training director of one company wrote a memo to several of his technical people indicating that it might help them considerably in their work. USC leased this course for broadcast.

3) Nine people from one company went to the Woodland Hills Regional Classroom to view the preview of the British Open University's Course on "Role Playing", it is believed that the company subsequently leased the course on its own.

These typical events, together with others, indicate that the previews do fulfill a useful function. However, potential impact of the approach in terms of reaching large numbers of interested persons will be influenced by the following considerations:

1) Growth of Leased Videotapes for Company Continuing Education

In a sense, this experiment was perhaps two to three years ahead of its time. Industry is just now beginning to adopt use of videotaped instruction for the continuing education of engineers. AMCEE, the Association for Media-Based Continuing Education for Engineers, in starting nationwide merchandising of videotaped courses just a few years ago discovered that few companies are yet accustomed to this approach to continuing education. AMCEE's publicity and promotional efforts are, in fact, beginning to alter this situation.

When more companies begin to look at videotaped courses as a cost-effective way to keep engineering staffs attuned to rapidly

changing technologies, interest in efficient and convenient ways of previewing courses will grow.

2) Growing Interest by Vendors in "Distributed" Previewing

As sales of such tapes begins to grow, and with it competition, vendors will be more and more interested in seeking this form of publicity outlet for their courses.

3) Expansion of Previewing Concept to Larger Distribution Networks

The power and efficiency of this technique will depend on the size of the distribution network. If regional ITFS or microwave educational networks are someday linked by satellite so that the viewer base is enlarged, "distributed" previewing will become an even more useful concept. In fact, AMCEE, in a recent proposal to HEW for such a satellite system, suggested the previewing concept tested under this grant as one of the important services that could be offered.

VII. VISITATIONS TO COMPANIES TO PROMOTE USE OF VIDEOTAPES FOR CONTINUING EDUCATION

As earlier stated, industry is generally still not accustomed to using television, either through broadcast or videotape, for continuing education of engineers. This was certainly true when this project was originally proposed although the situation has since improved to some degree.

As already discussed, one phase of this project has involved the direct broadcast of courses via ITFS to industry. Another phase involved the previewing of videotaped courses over the ITFS network to increase the awareness of company training officers of the wide variety of excellent materials becoming available on videotape. Still another phase of this "awareness generating" process, to be discussed in this section, involved visitations by a USC representative to companies to promote the use of videotapes. The companies chosen were generally small to medium sized. Also, most were located in the vicinity of the regional television classrooms in an attempt to make them more diversified industrial park learning centers.

It was presumed that the small to medium sized companies had probably never before leased a videotaped course or, for that matter, that they did not even own a videotape player, even though the price of these most useful devices was falling rapidly.

The USC representative chosen for the visitations was a staff member of the College of Continuing Education who had previously been a training officer at an aerospace company. Thus, he had a good feeling for the needs and problems of the types of companies to be visited. He worked part-time on the project.

He quickly confirmed the suspicion that most of the companies he visited did indeed not own a tape player and had never before used videotapes for continuing education. Several videotape players were therefore purchased under this grant so that the USC representative could demonstrate sample tapes when he visited the companies. In some cases, the videotape player would be loaned to a company for a week or two together with representative tapes so that the working engineers could watch the courses and express their opinions to management about their usefulness.

During 1977 and 1978, the USC representative visited 40 companies to inform them that previews of videotaped courses were being broadcast to the regional television classroom in their vicinity. He also tried to evaluate their interest in possibly leasing videotaped courses from USC or other organizations that USC represented. He often left a videotape player and some tapes with the person in charge of training.

For each company visited, an assessment form was completed that documented the company's previous experience with videotapes and an estimate of prospects for future use. The list of companies visited and a few of the assessment forms are included as Appendix M and Appendix N respectively.

The visitation process served a useful purpose. It did increase awareness as had been expected. In some cases, companies had had previous experience with videotapes and expressed interest in previewing some of the materials we had. In other cases, the company had never used before videotaped materials but was interested in experimenting with them. In a few cases, the company had no interest whatsoever; these were generally very small companies with no one in charge of training. In one case, the company training person had been trying to get funds from management for a videotape player but was not succeeding. A loan player was left with him which he used to run a videotaped course leased from USC. The experience was so positive that management did provide the budget for a tape player.

About the same time that this phase of the project was being initiated, the Association for Media-Based Continuing Education for Engineers (AMCEE) was beginning its promotional activity to convince more companies to consider using videotaped courses for continuing education. That effort, coupled with parallel efforts by commercial vendors of such materials, has succeeded in increasing the penetration of videotaped courses in American industry. The USC project, small and on a localized scale, was also successful. USC today leases a number of its courses as well as those of other universities to local industry as well as companies throughout the country. USC is third in "sales" amongst the 21 MCEE schools.

VIII. DEVELOPMENT OF EVALUATION CRITERIA FOR VIDEOTAPED COURSES

Because there is a rapidly growing number of videotaped courses becoming available, some means is needed to evaluate both the pedagogical and technical quality of the videotaped material. As already mentioned, the very nature of videotaped courses makes them inconvenient and costly in time to procure and to evaluate.

Since one phase of this project has involved obtaining videotaped courses from other sources from around the country, and broadcasting them to employees of companies in the USC Television Network, it was felt that if reactions could be obtained from these viewers about the effectiveness of these courses, this information would be useful to other potential users of the material. In fact, it was postulated that such a project might lead the way to a national service that would publicize user reactions to the large number of videotaped continuing education courses now becoming available nationally through the efforts of AMCEE and other "distributors". Such a service would be analogous to the movie ratings published by Consumer Reports.

Towards this end, a questionnaire was developed that could be used every time the USC Television Network leased a course from, say, another university and broadcast it for continuing education purposes. This questionnaire would be sent to all viewers in the companies in the USC Television Network and results would be tabulated. The results would then be made available to any other company or organization that might be interested in leasing the same course.

The questionnaire is provided in Appendix O. It asks that the course be rated on the basis of such criteria as relevance, achievement of objectives, effectiveness of the presentation, effectiveness for use on a self study basis (since the courses are on tape with no live instructor) and other significant parameters.

Appendix P presents the integrated results of ratings of a group of courses obtained from such organizations as Colorado State University, AMCEE, University of Michigan, SMU, Rochester Institute

of Technology, ACE-Stanford, Lawrence Livermore Laboratory, SMU, MIT, Texas Instruments and many other universities and organizations. The number of enrollees and number of respondents are indicated as well as an overall rating.

It is difficult to evaluate the success of this effort. Although an attempt was made to inform other users that such information was available, only a few requests for the information were received. The project requires a larger scale effort to improve its visibility coupled with the efforts of various large tape leasing organizations.

An inquiry was made to NSF at some point during the effort as to whether it would be interested in a separate larger proposal to establish such a project on a national scale. The answer was that NSF felt that it would be too controversial for it to become involved in supporting judgmental studies of the videocourse products of universities and commercial organizations.

Nevertheless, it is felt that some means for evaluation of videotaped courses is needed. Recent AMCEE experience indicates occasional deep disappointment of the part of companies that have leased university courses on videotape. Some means must be found to forewarn the customer and assessing audience reaction in a well organized and careful effort is probably the only meaningful way.

Progress under this grant has been widely communicated to other universities interested in the use of television for the delivery of both degree-oriented and continuing education. Dissemination has occurred by two major vehicles:

1. Newsletter

A newsletter report was developed that described the major innovations put into practice under auspices of this grant. These included: the concept of industrial park television classrooms open to employees of any company in the area; the development of special television programs for continuing education; the concept of the tape preview broadcast program; the idea of lending video tape players and tapes to companies to increase their awareness of the availability and effectiveness of videotaped courses for continuing education of company employees; the idea of using an ITFS system as a local network for the distribution of continuing education materials from universities and other sources around the country; and the development of evaluation criteria for continuing education videotaped courses and sharing the results with interested users outside the university.

The newsletter report is enclosed as Appendix Q. It was mailed to approximately 3000 people in universities and industry that it was felt would be interested in television approaches to continuing education.

2. AMCEE

Since USC is a founding member of AMCEE, the Association for Media Based Continuing Education for Engineers, this organization also provided a very effective forum for dissemination of ideas generated under this grant. Results were therefore easily communicated to the 20 universities that are members of AMCEE. Some of the concepts have, in fact, been adopted by some of the other schools. For example, ACE at Stanford has since established an industrial park classroom and many of the schools

subsequently followed USC's lead in broadcasting other school's videotaped courses over their ITFS networks. In fact, reciprocal relations have developed in which schools are using each other tapes. Also, as already mentioned, AMCEE has proposed the previewing of videotaped courses over future satellite distribution systems.